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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,462	12/04/2001	Steven R. Walther	V0077/7165WRM	5689

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Gary L. Loser, Esq.
Varian Semiconductor Equipment Associates, Inc.
35 Dory Road
Gloucester, MA 01930

EXAMINER	
CROWELL, ANNA M	

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/006,462	WALTHER, STEVEN R.	
	Examiner	Art Unit	
	Michelle Crowell	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6-9,15-17 and 28-39* is/are pending in the application.

4a) Of the above claim(s) *6-9,15-17 and 28-33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *34-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

Claims 6-9, 15-17, and 28-39 are pending in the application. Claims 6-9, 15-17, and 28-33 are withdrawn from consideration. Claims 34-39 are rejected.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR1.114. Applicant's submission filed on October 30, 2007 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 34-36 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Setoyama et al. (U.S. 6,196,155).

Referring to Figure 1 and column 4, line 32-column 5, line 33, Liebert et al. discloses a plasma doping apparatus comprising: a plasma doping chamber 10; a platen 14 located in the plasma doping chamber for supporting a workpiece 20 (col. 4, lines 32-36); an adjustable anode

24 spaced apart from the platen in the plasma doping chamber, the adjustable anode configured to be movable (direction perpendicular to the platen) within the plasma doping chamber (col.4, lines 44-46); a process gas source 36 coupled to the plasma doping chamber, wherein a plasma containing ion of the process gas is produced in a plasma discharge region between the anode and the platen (col.5, lines 4-8); a pulse source 30 for applying pulses between the platen and the anode for accelerating ions from the plasma into the workpiece (col.4, lines 50-57, col.5, lines 22-33).

Liebert et al. fail to teach a first plurality of magnetic elements disposed on an electrode.

Referring to column 5, line 1-column 6, line 49, Setoyama teaches a plasma processing apparatus wherein a first plurality of magnetic elements 20a (arranged in one or more annular rings (col. 5, lines 1-2)) are disposed on the anode 9, and the magnets 20a are vertically movable in order to change the processing rate (col. 6, lines 22-49). Additionally, in order to generate an effective magnetic field cusp, it is desirable to have magnets on surface of the anode electrode. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the adjustable anode of Liebert et al. to have a first plurality of magnets disposed on as taught by Setoyama et al. in order to generate an effective magnetic field cusp and hence achieve an uniform processing rate or change the processing rate.

With respect to claim 38, Liebert et al. in view of Setoyama et al. or Ohmi fail to teach the first plurality of magnetic elements have alternating polarities.

Referring to Figure 1 and column 4, line 52-column 6, line 49, Setoyama et al. teaches a plasma processing apparatus having magnetic elements 20b with alternating polarities facing the plasma discharge region (col. 5, lines 1-6) in order to increase the processing rate (col. 6, lines

18-21). In addition, the magnetic elements produce cusp magnetic fields 30 in a region surrounding the plasma discharge region (see Fig. 1). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the first plurality of magnetic elements of Liebert et al. with alternating polarities taught by Setoyama et al. in order to increase the processing rate.

3. Claims 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Ohmi (U.S. 5,272,417).

Referring to Figure 1 and column 4, line 32-column 5, line 33, Liebert et al. discloses a plasma doping apparatus comprising: a plasma doping chamber 10; a platen 14 located in the plasma doping chamber for supporting a workpiece 20 (col. 4, lines 32-36); an adjustable anode 24 spaced apart from the platen in the plasma doping chamber, the adjustable anode configured to be movable (direction perpendicular to the platen) within the plasma doping chamber (col.4, lines 44-46); a process gas source 36 coupled to the plasma doping chamber, wherein a plasma containing ion of the process gas is produced in a plasma discharge region between the anode and the platen (col.5, lines 4-8); a pulse source 30 for applying pulses between the platen and the anode for accelerating ions from the plasma into the workpiece (col.4, lines 50-57, col.5, lines 22-33).

Liebert et al. fail to teach a first plurality of magnetic elements disposed on an electrode.

Referring to Figure 1 and column 8, lines 48-62, column 11, lines 26-34, Ohmi teaches a plasma processing apparatus wherein a first plurality of magnet elements 106 are disposed on the anode 104 within the chamber in order to change the processing rate and generate high density

plasma. Additionally, in order to generate an effective magnetic field cusp, it is desirable to have magnets on surface of the anode electrode. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the adjustable anode of Liebert et al. to have a first plurality of magnets disposed on as taught by Ohmi in order to generate an effective magnetic field cusp and hence achieve an uniform processing rate or change the processing rate.

4. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Setoyama et al. (U.S. 6,196,155) or Ohmi (U.S. 5,272,417) as applied to claims 34-35 above, and further in view of Shan et al. (U.S. 6,022,446).

The teachings of Liebert et al. in view of Setoyama et al. or Ohmi have been discussed above.

Liebert et al. in view of Setoyama et al. or Ohmi fail to teach magnetic elements which are radially aligned to form a spoke configuration.

Referring to Figure 4a and column 8, lines 23-49, Shan et al. teaches a plasma processing apparatus wherein the magnetic elements 90 are radially aligned to form a spoke configuration. With this spoke configuration, a radially symmetrical magnetic field is generated to enhance processing rates. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the magnetic elements of Liebert et al. in view of Setoyama et al. or Ohmi in a spoke configuration as taught by Shan et al. since a radially symmetrical magnetic field is generated to enhance processing rates.

5. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Setoyama et al. (U.S. 6,196,155) or Ohmi (U.S. 5,272,417) as applied to claims 34-35 above, and further in view of Goeckner et al. (U.S. 6,182,604) and Suzuki et al. (U.S. 5,433,787).

The teachings of Liebert et al. in view of Setoyama et al. or Ohmi have been discussed above.

Liebert et al. in view of Setoyama et al. or Ohmi fail to teach a hollow electrode surrounding the plasma discharge region.

Referring to Figure 2a-b and column 5, line 26-column 6, line 6, Goeckner et al. teaches a plasma doping apparatus which uses a hollow electrode 300 surrounding the plasma discharge region in order to produce a more uniform plasma at a lower gas pressure. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Liebert et al. in view of Setoyama et al. or Ohmi with a hollow electrode surrounding the plasma discharge region as taught by Goeckner et al. in order to produce a more uniform plasma at a lower gas pressure.

Liebert et al. in view of Setoyama et al., and Goeckner et al. fail to teach a second plurality of elongated magnetic elements affixed within the hollow electrode.

Referring to column 8, lines 38-43, Suzuki et al. teaches a plasma processing apparatus wherein a plurality of magnet elements 13 are affixed within the hollow electrode. It is conventionally known in the art to affix magnets with an electrode in order to enhance uniform plasma consistency. Additionally, regarding the shape of the elongated magnets, it should be noted that the shape of the claimed elongated magnet was a matter of choice which a person of

ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed elongated magnet was significant. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the hollow electrode of Liebert et al. in view of Setoyama et al. or Ohmi and Goeckner et al. with a second plurality of elongated magnetic elements affixed within the hollow electrode as taught by Suzuki et al. since this would enhance uniform plasma consistency.

Response to Arguments

6. Applicant's arguments filed October 30, 2007 have been fully considered but they are not persuasive.

Applicant has argued that claim 34 fails to require magnetic elements with alternate polarities; however, claims 34-36 and 38 are rejected by Liebert et al. in view of Setoyama and claim 38 requires magnetic elements with alternate polarities.

Applicant has argued that claim 34 fails to require changing the processing rate but rather requires controlling a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece. First, it should be noted that "changing the processing rate" was the motivation used to dispose a plurality of magnets on an adjustable anode. Furthermore, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. (In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997)). In the instant case, Liebert

in view of Setoyama or Ohmi teach the structure of a plurality of magnetic elements disposed on an adjustable anode and being movable within a plasma doping chamber and hence is capable of controlling the a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece. Therefore, the apparatus of Liebert et al. in view of Setoyama et al. or Ohmi satisfies the claimed requirement.

Applicant has argued that Hirata fails to teach a plurality of magnetic elements disposed on an adjustable anode; it should be noted that the Hirata reference has been dropped from the primary 103 rejection and hence the argument is moot.

Applicant has argued that Setoyama fails to teach magnetic elements configured to control radial density distribution. As stated above, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. (In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997)). In the instant case, Liebert et al. teaches a movable anode 24 located within a plasma doping chamber. Setoyama was simply applied to show that magnet elements 20a can be disposed on an anode 9 and Ohmi demonstrates that magnet elements 106 can be disposed on an anode 104 within a plasma chamber. Furthermore, by modifying the movable anode of Liebert to include the magnet elements of Setoyama or Ohmi, then the magnet elements would have to move when the movable anode moved. Thus, Liebert in view of Setoyama or Ohmi teach the structure of a plurality of magnetic elements disposed on an adjustable

anode and being movable within a plasma doping chamber and hence is capable of controlling the a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece. Therefore, the apparatus of Liebert et al. in view of Setoyama et al. or Ohmi satisfies the claimed requirement.

Applicant has argued that Shan fails to teach magnetic elements configured to control radial density distribution. It should be noted one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the instant case, Shan was simply applied for the teaching of magnetic elements which are radially aligned to form a spoke configuration. As stated above, Liebert in view of Setoyama or Ohmi teach the structure of a plurality of magnetic elements disposed on an adjustable anode and being movable within a plasma doping chamber and hence is capable of controlling the a radial density distribution of the plasma and thereby the dose uniformity of the ions implanted into the workpiece. Therefore, the apparatus of Liebert et al. in view of Setoyama et al. or Ohmi satisfies the claimed requirement.

Applicant has argued that magnets of Setoyama are external to the chamber and are not movable within the plasma doping chamber. However, it should be noted that the

magnets 2a of Setoyama are located in direct contact with the surface of the anode 9 and hence in order to implement the magnets into the Liebert reference one would place the magnets in direct contact with the movable anode 24 which is located inside of the chamber. By having the magnets on the surface of the anode, an effective magnetic field cusp is achieved. Additionally, the magnets 106 of Ohmi are disposed on the anode 104 and located within the plasma chamber. Therefore, the apparatus of Liebert et al. in view of Setoyama et al. or Ohmi satisfies the claimed requirement.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-Th (9:30 -6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michelle Crowell
Patent Examiner
Art Unit 1792

Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1792